National Institute of Environmental Health Sciences

The impact of heat islands on mortality in Paris during the August 2003 heatwave

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Year: 2012

Journal: Environmental Health Perspectives. 120 (2): 254-259

Abstract:

Background. Heatwaves have a drastic impact on urban populations, which could increase with climate change. Objectives. The objective of this study was to evaluate, from a public health prevention perspective, new indicators of elderly people's exposure to heat in Paris using satellite thermal images. Methods. We used a time series of 61 NOAA-AVHRR images from August 1 to 13, 2003, to produce thermal indicators of minimum, maximum, and mean surface temperatures, and diurnal temperature amplitude, with different lags between the meteorological data and the health impact. Health data came from a case-control study involving 241 people aged 65 years and over who died in the city of Paris or the nearby suburban area of Val-de-Marne during the August 2003 heatwave, and 241 controls that were matched to cases on age, sex and residential zone. For each person, we integrated the thermal indicators in a conditional logistic regression model, adjusted for age and other potential confounders. We computed odds ratios comparing the 90th and 50th percentiles of the temperature differences between cases and controls for various indicators. Results. Mortality risk was significantly associated with exposure for two indicators: minimum temperatures averaged from August 1 to 13 (OR 2.17, 95% CI 1.14-4.16 for a 0.41 degrees C increase), and minimum temperature averaged on the day of death and the six preceding days (OR 2.24, IC95% 1.03-4.87 for a 0.51 degrees C increase). Conclusions. These results support the influence of night temperatures on the health impact of heatwaves in urban areas. Urban heat exposure indicators based on satellite imagery have the potential to identify areas with higher risk of death, which could inform intervention decisions by key stakeholders.

Source: http://dx.doi.org/10.1289/ehp.1103532

Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Temperature

Temperature: Extreme Heat

Geographic Feature:

resource focuses on specific type of geography

Urban

Geographic Location: ☑

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Country

Other European Country : France

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Morbidity/Mortality

Population of Concern: A focus of content

Population of Concern: ☑

populations at particular risk or vulnerability to climate change impacts

Elderly

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified